

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To: ANDREW V. SMITH FOTONATION 3099 ORCHARD DR. SAN JOSE, CA 95134

Date of mailing <i>(day/month/year)</i>	10 SEP 2008
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Applicant's or agent's file reference FN-211-PCT	FOR FURTHER ACTION See paragraphs 1 and 4 below
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International application No. PCT/US 08/67746	International filing date <i>(day/month/year)</i>	20 June 2008 (20.06.2008)
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Applicant FOTONATION IRELAND LIMITED

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland. Facsimile No.: +41 22 740 14 35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk 571-272-4300 PCT OSP 571-272-7774
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference FN-211-PCT	FOR FURTHER ACTION		see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 08/67746	International filing date (day/month/year) 20 June 2008 (20.06.2008)	(Earliest) Priority Date (day/month/year) 21 June 2007 (21.06.2007)	
Applicant FOTONATION IRELAND LIMITED			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☐ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 18
☐ as suggested by the applicant.
☒ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/67746

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G06K 9/00, H04N 5/228, G06K 9/62, G06T 1/00 (2008.04)

USPC - 382/236, 348/208.4, 348/400.1, 382/284

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC - 382/236, 348/208.4, 348/400.1, 382/284

(first search)

IPC(8) - G06K 9/00, H04N 5/228, G06K 9/62, G06T 1/00 (2008.04)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC - 382/236, 348/208.4, 348/400.1, 382/284

(first search)

IPC(8) - G06K 9/00, H04N 5/228, G06K 9/62, G06T 1/00 (2008.04)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST (USPT, PGPB, EPAB, JPAB); google.com

Search Terms Used: correcting, correction, retouch, blink, closed, red-eye, expression, image, images, reference, image, images, photography, picture, enhanced, enhancing, motion, freeze, capture, previous, smile, facial expression, blur

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/0110417 A1 (Itokawa) 17 May 2007 (17.05.2007), entire document, especially Abstract; paras [0006]; [0010]; [0034]; [0047]; [0054]; [0055]; [0079]; [0081]; [0083]-[0085]; claim 17	1-8, 12-25, 29-44, 47, 48, 50-52
Y		9-11, 26-28, 45, 46, 49
Y	US 7,146,026 B2 (Russon et al.) 05 December 2006 (05.12.2006), entire document, especially Abstract	9-11, 26-28, 45, 46, 49
A	US 2005/0128518 A1 (Tsue et al.) 16 June 2005 (16.06.2005), entire document, especially Abstract	1-52
A	US 2005/0153472 A1 (Sakata et al.) 13 July 2006 (13.07.2006), entire document, especially Abstract	1-52

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"G" document member of the same patent family

Date of the actual completion of the international search

01 September 2008 (01.09.2008)

Date of mailing of the international search report

10 SEP 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
ANDREW V. SMITH
FOTONATION
3099 ORCHARD DR.
SAN JOSE, CA 95134

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) **10 SEP 2008**

Applicant's or agent's file reference
FN-211-PCT

FOR FURTHER ACTION

See paragraph 2 below

International application No.
PCT/US 08/67746

International filing date (day/month/year)
20 June 2008 (20.06.2008)

Priority date (day/month/year)
21 June 2007 (21.06.2007)

International Patent Classification (IPC) or both national classification and IPC
IPC(B) - G06K 9/00, H04N 5/228, G06K 9/62, G06T 1/00 (2008.04)
USPC - 382/236, 348/208.4, 348/400.1, 382/284

Applicant **FOTONATION IRELAND LIMITED**

1 This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2 FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1b(a) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Date of completion of this opinion <p style="text-align: center;">29 August 2008 (29.08.2008)</p>	Authorized officer <p style="text-align: center;">Lee W. Young</p> <small>PCT Hq/OSK 571-272-4300 PCT OSP 571-272-7774</small>
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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 08/67746

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper
☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed
☐ filed together with the international application in electronic form
☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 08/67746

Box No. V Reasoned statement under Rule 43bis.1 (a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	9-11, 26-28, 45, 46, 49, 51, 52	YES
	Claims	1-8, 12-25, 29-44, 47, 48, 50	NO
Inventive step (IS)	Claims	none	YES
	Claims	1-52	NO
Industrial applicability (IA)	Claims	1-52	YES
	Claims	none	NO

2. Citations and explanations:

Claims 1-8, 12-25, 29-44, 47, 48, and 50 lack novelty under PCT Article 33(2) as being anticipated by US 2007/010417 A1 (Itokawa).

As per claims 1, 22, and 36, Itokawa discloses a digital image processing method and image capture device for detecting and correcting visual imperfections using a reference image, comprising: (a) capturing, on a hand-held or otherwise portable or spatial or temporal performance-based image capture device, a main image and one or more reference images having temporal or spatial overlap or proximity with the main image, or combinations thereof (see Abstract, para [0008]); (b) analyzing on the device the one or more reference images for enhancing the main image (see para [0079]); (c) correcting on the device one or more defects or other sub-optimal characteristics in the main image based on the analyzing of the one or more reference images to create a modified image comprising an enhanced version of the main image (see Abstract, para [0010]); (d) displaying, printing, transmitting, or storing the modified image or a further processed version thereof (see Abstract); (e) whereby the correcting on the device of the one or more defects of other sub-optimal characteristics of the main image based on the analyzing of the one or more reference images produces at the device an enhanced main image from an original image in real-time with spatial economy and performance efficiency (see Abstract, para [0008]; [0010]; [0079]).

As per claims 38, 39, and 43, Itokawa discloses a handheld or otherwise portable or spatial or temporal performance based image capture device, comprising: (a) one or more lenses, one or more apertures and one or more sensors for capturing a main image and/or more reference images having a temporal or spatial overlap or proximity or combinations thereof, with the capturing of the main image, or combinations thereof, and the main image is captured using a primary optical system while the one or more reference images are captured using a secondary optical system differing from the primary optical system in focal length, depth of field, depth of focus, exit pupil, entry pupil, aperture, or lens coating, or other optical parameter of a designed lens, or combinations thereof (see Abstract, para [0008]; [0010]; [0079]); (b) a processor (see para [0047]); (c) one or more processor-readable media having embedded code therein for programming the processor to perform a digital image processing method that comprises: (i) analyzing on the device the one or more reference images for enhancing the main image (see para [0047]; [0079]); (ii) correcting on the device the one or more defects or other sub-optimal characteristics in the main image based on the analyzing of the one or more reference images to create a modified image comprising an enhanced version of the main image (see para [0010]); and (iii) displaying, printing, transmitting, or storing the modified image or a further processed version thereof (see Abstract); (iv) whereby the correcting on the device of the one or more defects of other sub-optimal characteristics of the main image based on the analyzing of the one or more reference images produces at the device an enhanced main image from an original image in real-time with spatial economy and performance efficiency (see Abstract, para [0008]; [0010]; [0079]).

As per claims 2 and 23, Itokawa discloses the method of claim 1 and image capture device of claim 22, wherein the main image and at least one reference image comprise flash and non-flash version of a substantially same scene (see para [0081]).

As per claims 3 and 32, Itokawa discloses the method of claim 1 and image capture device of claim 22, wherein at least one reference image comprises a hi-speed capture to freeze motion of a substantially same scene as captured in the main image, and said one or more defects comprise a motion defect (see Abstract, para [0081]).

As per claims 4 and 33, Itokawa discloses the method of claim 1 and image capture device of claim 22, wherein at least one reference image comprises an infrared version of substantially the same scene as captured in the main image to enhance heat emitting objects in the frame (see claim 17).

As per claims 5 and 34, Itokawa discloses the method of claim 1 and image capture device of claim 22, wherein the main image and at least one reference image comprise different focal distances (see para [0083]; [0084]).

As per claims 6 and 35, Itokawa discloses the method of claim 1 and image capture device of claim 22, wherein one or more reference images comprise a plurality of images organized as a video clip (see para [0034]).

As per claims 7 and 24, Itokawa discloses the method of claim 1 and image capture device of claim 23, further comprising segmenting the main image into foreground and background regions, and modifying one of the foreground and background regions based on the one or more reference images while not similarly modifying the other of the foreground and background regions (see para [0083]).

(see continuation of citations and explanations in first supplemental box)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 08/67746

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of
Box No. V(2) -- citations and explanations

As per claims 8 and 25, Itokawa discloses the method of claim 1 and image capture device of claim 22, further comprising detecting a region containing a face within the original main image, and modifying the face region based on the one or more reference images (see para [0083]; face - portrait).

As per claims 12 and 29, Itokawa discloses the method of claim 1 and image capture device of claim 22, further comprising correcting a blur defect in the main image based on the one or more reference images (see Abstract).

As per claims 13 and 30, Itokawa discloses the method of claim 12 and image capture device of claim 29, wherein the blur defect is caused by an incorrect depth of field (see para [0054]; [0055]).

As per claims 14 and 31, Itokawa discloses the method of claim 12 and image capture device of claim 29, wherein the blur defect is caused by motion during image capture (see Abstract).

As per claim 15, Itokawa discloses the method of claim 1, wherein the one or more reference images are captured using one or more different capture parameters than the main image (see para [0079]).

As per claims 16 and 37, Itokawa discloses the method of claim 15 and image capture device of claim 36, wherein the one or more different capture parameters include exposure time, dynamic range, contrast, sharpness, color balance, or white balance, or combinations thereof (see para [0079]).

As per claim 17, Itokawa discloses the method of claim 1, wherein the main image is captured using a primary optical system while the one or more reference images are captured using a secondary optical system differing from the primary optical system in focal length, depth of field, depth of focus, exit pupil, entry pupil, aperture, or lens coating or other optical parameter of a designed lens, or combinations thereof (see Abstract; para [0054]; [0055]; [0079]).

As per claim 18, Itokawa discloses the method of claim 1, wherein the one or more reference images include at least one reference image that includes only one or more sub-component features of an overall scene captured in the main image (see para [0079]; portrait, background).

As per claims 19 and 40, Itokawa discloses the method of claim 18 and image capture device of claim 39, wherein the one or more sub-component features comprise a center of the overall scene captured in the main image (see para [0085]).

As per claims 20 and 41, Itokawa discloses the method of claim 18 and image capture device of claim 39, wherein the one or more sub-component features comprise a face, faces, or region or regions of a face or faces captured in the main image (see para [0079]; [0085]; face - portrait).

As per claims 21 and 42, Itokawa discloses the method of claim 18 and image capture device of claim 39, wherein the one or more sub-component features comprise a foreground region of the overall scene captured in the main image (see para [0079]; [0085]).

As per claim 44, Itokawa discloses the device of claim 43, wherein the one or more reference images comprise a reference image including an eye region, and said correcting comprises replacing a corresponding eye region of the main image with said eye regions of said reference image (see para [0010]; [0079]; eye - portrait).

As per claim 47, Itokawa discloses the device of claim 43, wherein the one or more reference images comprise data of a region of interest (ROI) at a same or higher resolution as said main image (see para [0079]; ROI - portrait, background).

As per claim 48, Itokawa discloses the device of claim 47, wherein the ROI includes an eye region (see para [0079]; eye - portrait).

As per claim 50, Itokawa discloses the device of claim 47, wherein the ROI includes a mouth region (see para [0079]; mouth - portrait).

Claims 51 and 52 lack an inventive step under PCT Article 33(3) as being obvious over Itokawa.

As per claim 51, Itokawa does not specifically disclose the device of claim 50, further comprising determining that said mouth region has a better smile than a corresponding mouth region in the main image, and replacing the mouth region in the main image with the mouth region of the one or more reference images. However, Itokawa does disclose replacing defective portions of a portrait segment of an image with a reference image to correct the defects (see Abstract; para [0010]; [0079]). Therefore, it would have been obvious to one of ordinary skill in the art to replace specific parts of an image, because this allows the best parts of several images to be edited together into a superior result.

As per claim 52, Itokawa discloses the device of claim 51, wherein said mouth region of said one or more reference images is captured a fraction of a second before or after said main image (see para [0034]; [0079]).

(see continuation of citations and explanations in second supplemental box)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No
PCT/US 08/67746

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
citations and explanations from first supplemental box

Claims 9-11, 26-28, 45, 46, and 49 lack an inventive step under PCT Article 33(3) as being obvious over Itokawa in view of US 7,146,026 B2 to Russon et al. (hereinafter "Russon").

As per claims 9 and 26, Itokawa does not disclose the method of claim 8 and image capture device of claim 25, wherein the modifying comprises correcting a red-eye defect within the face region of the main image based on the one or more reference images. However, Russon discloses correction of an eye defect within the face region of the main image based on the one or more reference images (see Abstract). It would have been obvious to one of ordinary skill in the art to combine the system of Itokawa with the eye correction of Russon to provide correction of a common source of picture ruination. Itokawa and Russon do not specifically disclose red-eye. However, Russon discloses correction of an eye defect within the face region of the main image based on the one or more reference images (see Abstract). Therefore, it would have been obvious to one of ordinary skill in the art to correct red-eye because as a common eye defect in images.

As per claims 10 and 27, Russon discloses the method of claim 8 and image capture device of claim 25, further comprising correcting a blink within the face region of the main image (see Abstract).

As per claims 11 and 28, Russon discloses the method of claim 8 and image capture device of claim 25, further comprising changing a facial expression within the face region of the main image (see Abstract, facial expression - eyes).

As per claim 45, Itokawa does not disclose the device of claim 44, wherein said eye region in the main image that is replaced is determined to be closed or semi-closed. However, Russon discloses said eye region in the main image that is replaced is determined to be closed or semi-closed (see Abstract). It would have been obvious to one of ordinary skill in the art to combine the system of Itokawa with the eye correction of Itokawa because this corrects the most common source of picture ruination.

As per claims 46 and 49, Itokawa discloses the device of claim 45 and claim 48 wherein said reference that comprises said eye region is captured a fraction of a second before or after a blinking action (see para [0079]; [0010]).

Claims 1-52 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.